Economics 475: Econometrics
Winter Quarter, 2023

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Course Objectives: This course extends the fundamentals of Ordinary Least Squares and its applications. By the end of the course, students will understand the concepts of mathematical expectation, linear and non-linear efficient and unbiased estimators, and the intuition behind these statistics. Topics to be covered include the Gauss-Markov Theorem, heteroskedasticity, autocorrelation, endogeneity, and multicollinearity. Non-linear least squares and maximum likelihood estimation applied to binary choice models and count data will be explored. Time permitting, we will also explore panel data techniques and regression discontinuity estimators.

Resources: The textbook for this class is Damodar Gujarati and Dawn Porter's "Basic Econometrics," 5th edition. I will post homeworks with their answers, along with answers to quizzes and midterms on my webpage. Students will also be required to use specialized econometric software to complete homework assignments. The College of Business and Economics supports one such program: Stata. Stata is freely available (with registration for this class) but it is available only in the Parks Hall computer labs. Stata is also used in Econ 470. Student versions of Stata may be purchased inexpensively at http://www.stata.com/order/new/edu/gradplans/student-pricing/

I will make recordings of this class used during Covid-19 available on my website. These are not a substitute for coming and participating in class, but should serve as an additional resource to help understand the material.

Course Outline: Economics 475 is a class that requires a good deal of mathematical and statistical knowledge. If you are not familiar with the concepts of general statistics, hypothesis testing, and mathematical maximization/minimization then please start in either Economics 375 or Math 341—either of these classes are prerequisites for Econ 475. I will assume that students have an understanding of two-variable regression analysis (ch. 1-3 of Gujarati & Porter), the definition of the classical assumptions (ch. 4), hypothesis testing (ch. 5), knowledge of the varying linear functional forms of regressions (ch. 6 & 9), multiple regression analysis (ch. 7 & 8), and model specification (ch. 13). Economics 475 will begin by proving the Gauss-Markov Theorem; this is basically the material that starts in Part 2 of the Gujarati & Porter textbook. We will then spend the first half of the class on violations of the classical assumptions used to prove Gauss-Markov. Specifically, we will cover heteroskedasticity (ch. 11), touch on autocorrelation (ch. 12), and simultaneous equations (ch. 18 – 20). After covering these topics we will conclude the course by covering nonlinear least squares (ch. 14), maximum likelihood estimation (ch. 4) applied to logits and probits (ch. 15), panel data methods (ch. 16) and, time permitting, discuss some approaches to causal estimation like RD models.

Grading and Assessment: I will evaluate how you meet the course objectives through three tools: a midterm, various homeworks, and a final paper. Expect about one homework per topic for a total of around 6 homeworks throughout the quarter. Homework will be assigned weekly (approximately) and will include computer and analytical work. The midterm will occur upon completion of the simultaneous equations material and before the maximum likelihood material. Traditionally this occurs in the 5th or 6th week of a 10 week class and because of the unique course schedule of this class. The final project will be a written research paper that employs the statistical techniques employed in

class using data either generated or discovered by the student. This paper will be due at 5pm on the day the final exam for this course is scheduled.

Your grade will be determined by the following weights:

Homework:	15%	Midterm:	40%	Final Paper:	45%

Classroom Dishonesty: Cheating on American campuses has become a common event. Surveys indicate that more than 80% of college graduates have cheated at least once during their tenure in higher education. Cheating is not a victimless crime. Grades earned through illegitimate means reduce the value of the grades earned by honest students. Therefore, students caught cheating will immediately be failed from my course. For more information regarding Western Washington University's Academic dishonesty policy, please review the current Academic catalog, Appendix D.